Amendments to the Drawings:

Enclosed is a replacement sheet 1 (of the original 8 sheets). Please cancel Fig. 1 and replace with amended Fig. 1, fully supported by the original specification, for example, on page 5, as described in detail below. No new matter has been entered.

Enclosed is a replacement sheet 3 (of the original 8 sheets). Please cancel Figs. 3 and 4, and replace with amended Figs. 3 and 4, without reference numerals 12, 22, 32 and 38. No new matter has been entered.

REMARKS

In the Office Action of September 19, 2005, the Examiner objected to the drawings. Applicant amended Fig. 1 to show a source **S** and a detector **D**. This amendment is fully supported by the original specification, for example, on page 5 which describes a source probe 72 including a light coupling port 74 as follows: "The probe has a single light coupling port made of the fibers bundled together and arranged to achieve efficient coupling of light from a light source (e.g., a light bulb, a light emitting diode, a laser) to the probe. Alternatively, the probe has multiple light coupling ports (e.g., one port per fiber), wherein the generated light is coupled into the fibers sequentially or simultaneously." (Page 5, lines 19 – 26.) Furthermore, the original specification describes, for example, on page 5 a detection probe 75 including a light coupling port 77 as follows: "At the proximal end, the detection fibers may also be bundled together to form a single light coupling port 77, which provides good coupling to a wide area detector (e.g., a diode detector, a PMT detector or a MCPD detector)." (Page 5, line 32 through page 6, line 3.)

Applicant amended the present specification to include Fig. 5A. Fig. 5A was originally described in the Brief Description of the Drawings, and this Figure is related to Fig. 5. (*See the original Brief Description of the Drawings*)

This application is a continuation of the grandparent application PCT/US1996/11630, which was originally *incorporated by reference.* This application is also a continuation-in-part of PCT application PCT/US1996/00235, filed on January 2, 1996, which was originally *incorporated by reference.* Furthermore, this application originally *incorporated by reference* the priority application PCT/US95/15666, filed on Filed on December 4, 1995, which explains in detail the spectrophotometer embodiments operating as trend indicator, hematoma monitor, tumor detector, and imager. The above-mentioned PCT application already issued as US Patents 6,957,094; 6,493,565; 6,526,309; and 5,987,351. The novel coupling of light for use

with these spectrophotometer embodiments is described in the present application. Furthermore, a hematoma detector, a hematoma monitor, a tumor detector, an imager or a metabolic condition monitor together with the described the optical coupler devices were claimed in the original PCT claim 24 (in PCT application PCT/US1996/11630).

In the Office Action of September 19, 2005, the Examiner rejected claim 47 under 35 U.S.C. §112, first paragraph. Applicant respectfully disagrees with this rejection. Claim 47 is directed to an optical examination device, similarly as was, for example, the original claim 2 (filed on September 9, 2003).

Furthermore, Applicant has amended and clarified claim 47. The amended claim 47 is fully supported by the present specification. For example, the original specification explains their use, for example, on page 8, line 20 through page 11, line 5:

> Imaging center 95 employs a TRS system described in U.S. Pat. No. 5,119,815 or in U.S. Pat. No. 5,386,827. The TRS system includes a Ti sapphire tunable laser that generates a series of light pulses of different wavelengths in the NIR region, sensitive to an endogenous or exogenous pigment. The light pulses, generated as shown in a timing diagram of FIG. 2A, are transmitted via fiber conduit 91 to fiber junction box 92. At fiber junction box 92 the signals are multiplexed to the 32 fibers that transmit light to and receive light from appropriate places in the brain. A single optical fiber may also be connected to fiber branches which are attached to various places on the head. The TRS system also includes two 8 multi-anode micro-channel plate detectors. The detector output is sent to a parallel computer that generates images congruent with the MRI scan and completed in approximately the same time as the MRI data.
>
> To achieve proper coupling, the fibers are indexed in space to form an array and are encoded appropriately by an index pad that mimics the tissue positions. This identifies the position of the fibers in the array 1 through 32 relative to a master synchronizing pulse. The imaging sequence consists of a series of pulses transmitted through the main fiber to an identified site at selected intervals (e.g., 5 nanosecond). Each pulse generates a photon migration pattern which is received through an identified optical coupling fiber and is recognized by the central computer as originating from a certain receiving fiber or set of receiving fibers by time encoding. The transmitter pulse stimulates all transmit fibers in sequence. Similarly, the pattern received is a composite of all receiver positions. The imaging console "knows" not only the location of the fiber, but also identifies the signal received from the fiber conduit by its time sequence with respect to the synchronizing pulse. The transmission/reception algorithm consists of a sequence of excitation pulses followed by photon diffusion patterns detected

at the particular positions selected specifically for the organ being studied.

The system may use a generic transmission/reception algorithm designed for an average organ or a patient specific algorithm. Furthermore, different algorithms may be used for ipsilateral, contralateral, de novo or recurrent brain bleeding. The optical coupler can be attached to the head (or any part of the body) for longer periods of time to monitor evolution of a tissue state (e.g., brain bleeding, compartment syndrome, or changes in a stroke induced volume) during and after administration of a specific drug. For example, the system can also monitor evolution of a stroke induced volume or changes in intracranial pressure after administration of an osmotic agent (e.g., mannitol, glycerol), texamethasone (with its effects delayed for several hours) or another drug that temporarily reduces brain oedema. The system can also monitor evolution of a solute (e.g., glucose) as it equilibrates in the bloodstream.

Computer system 96 provides an overlay of the two images with contrast due to vascularity/ vasculogenesis, blood vessels permeability, proliferation/degeneration of intracellular organelles, or some other tissue characteristics. To properly correlate the optical images to the NMR images, the optical images need to have an adequate contrast. The desired gradient of contrast is accomplished by selecting a suitable contrast agent (i.e., an exogenous pigment) and a wavelength of the introduced light. The spectrophotometer may construct separate images based on the scattering coefficient or the absorption coefficient. Furthermore, imaging center 95 may employ an amplitude modulation system or a CW system rather than the TRS system to increase resolution for some types of images.

In the case of brain examination, for instance, it is desired to detect and localize abnormal regions of 2 to 3 cm in diameter. This is the characteristic size of a hematoma or brain bleed which creates significant risk to the patient. One of the difficulties in employing spectrophotometric examination is the fact that the hair of a subject may be brushed in a certain way which accumulates more hair on one side than on the other. According to the invention, an optical coupler is provided having fibers that have freely protruding end portions of sufficient length to penetrate the hair and enter between the hair follicles. In some instances, especially in the use of large optical fibers, it is practical to use fibers of the order of 32 in number, both for the source and detector, for the purposes of continuous wave (CW) examination.

Therefore, amended claim 47 is clearly patentable.

Applicant has also included new claims 48 – 65 fully supported by the original specification. For example, new claims 48 - 55 are based on the original PCT claims 6 – 13, respectively (*See PCT Application PCT/US1996/11630, and the claims of the present application as filed on September 9, 2003*). New claims 56 – 59 are based on the original PCT claims 14, 15, 17, 18, 19 or 21. New claims 60 - 63 are based on the

original PCT claim 8, the summary or the specification. New claims 64 – 67 also claim a disposable protective element that was recited in the original PCT claims 27 - 34, and described in the specification.

Claim 47 is clearly patentable over the prior art of record. The present invention, as claimed in claim 47, is directed to a novel optical examination device, for *in vivo* tissue examination, utilizing optical fibers having arrayed proximal ends and transmitting light to and from the examined biological tissue. The optical examination device includes an optical source for emitting light in the visible to infrared range, an optical detector for detecting light; and a controller. The array of optical fibers includes end portions freely protruding from a support and arranged for engaging the scalp or skin of a subject at distal ends of the fibers. The optical fibers include proximal ends arrayed for coupling light from the light source into source fibers and for coupling light from detector fibers into the optical detector by indexing in space fiber locations with respect to tissue positions corresponding to the distal ends engaging the scalp or skin of the examined subject. The controller is constructed and arranged to control operation of the light source and the optical detector and control introduction and detection of light at the arrayed proximal ends.

Dependent claims 48 – 67 are directed to additional novel combinations of features. For example, claims 56 and 57 are directed to a handheld probe, while claim 64 is directed to the device including disposable protective elements, etc.

Accordingly, Applicant believes that all pending claims are in condition for allowance and such action is respectfully requested. Should there be any outstanding issue left, the Examiner is respectfully invited to call the undersigned at the telephone number provided below.

Please apply any PTO fees or any credits to Deposit Account 50-2196.

Respectfully submitted,

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April 29, 2006

Ivan D. Zitkovsky